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MEMORANDUM FOR PRS (In-House Publication)

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SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-TP-2002-009**
Keith McFall, "Technology for Sustainment of Strategic Systems"

Tech Horizons **(Statement A)**
(Deadline: 18 Jan 2002)

Technology for Sustainment of Strategic Systems

AFRL Propulsion Programs Make Important Contributions to Sustaining Strategic Technology Development Capability

AFRL's Propulsion Directorate, Space and Missile Propulsion Division, Motor Branch, Edwards AFB

The objectives of the Technology for Sustainment of Strategic Systems (TSSS) program are to enable improved strategic system capabilities, reduce system cost and sustain the capabilities needed to develop future systems. The Air Force Research Laboratory Propulsion Directorate (AFRL/PR) leads three strategic system propulsion technology development areas under the TSSS program: Missile Propulsion, Aging and Surveillance and Post Boost Control System. These Air Force managed efforts are enabling the United States solid rocket industry to significantly advance propulsion technology, providing increased performance, reduced cost and increased reliability compared to present state of the art systems. Through the government funded TSSS programs, often augmented by industry investments, the capability of the nation to maintain a superior deterrence capability into the future is being greatly enhanced.

The goals of the Missile Propulsion development efforts are a 25 % improvement in motor mass fraction, a 4 % increase in specific impulse, a 50 % reduction in stage failure rate, and a 25 % reduction in hardware and support cost. The efforts began in 1998 with the initiation of advanced propellant, case and insulation component development programs. These programs developed and characterized the technologies needed to achieve the TSSS Missile Propulsion goals. In addition, the Integrated High Payoff Rocket Propulsion Technology (IHPRPT) Phase I Missile Propulsion demonstrator motor (Fig 1) utilized one of the TSSS propellants in the successful demonstration (Fig 2) of IHPRPT Phase I goals. The two TSSS Missile Propulsion Demonstration programs, which began in 2001, are leveraging the technologies developed during the component development programs. The demonstration programs, which have multiple interim subscale motor demonstrations scheduled to occur in 2002 and 2003, will conclude in 2004 with full-scale motor demonstrations to validate goal compliance.

The goals of the Aging and Surveillance development efforts are to increase the "look-ahead" window for predicting motor condition from its current five years to 10 years, and reduce time and cost to process Non-Destructive Evaluation (NDE) data by 50%. The programs supporting achievement of these goals began in 1998 and focus on the development of analysis techniques and diagnostic systems. To achieve the "look-ahead" window increase, sophisticated motor system analytical models are being developed and rigorously validated. Advanced diagnostic systems and analysis methodologies are currently under development to meet the NDE goals. The program has already transitioned diagnostic key technology to the Army to support the inspection of munitions. When completed in 2004, the Aging and Surveillance development efforts will greatly enhance solid rocket motor service life predictive capability.

The goals of the Post Boost Control System (PBCS) development efforts are to reduce system cost by 25 % and increase operating pressure range by more than 150%. The component development program, begun in 1998, focuses on advanced propellants, materials and fabrication techniques. The technologies validated during the component development program will be leveraged in a demonstration effort, scheduled to begin in 2002. The PBCS demonstration program will conclude in 2005 with full-scale validation testing to confirm achievement of all program goals.

The Air Force Research Laboratory Propulsion Directorate's TSSS technology development efforts are providing military and commercial users with capabilities significantly greater than state of the art solid rocket propulsion systems. These programs also serve a critical role in sustaining the technology development capability of the solid rocket industry.

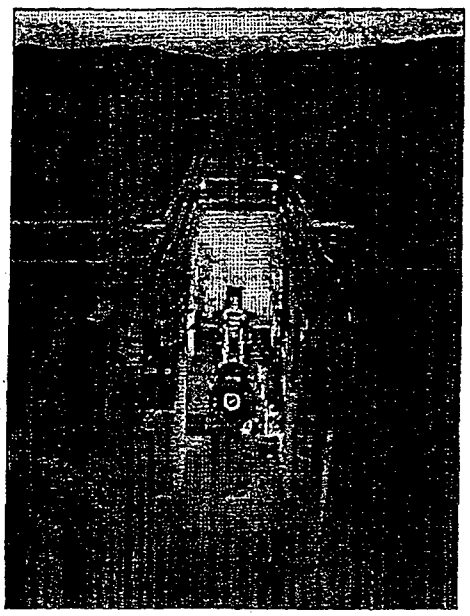

Fig 1: The IHPRPT Phase I Missile Propulsion demonstration motor at the contractor's, Alliant Techsystems, facilities.

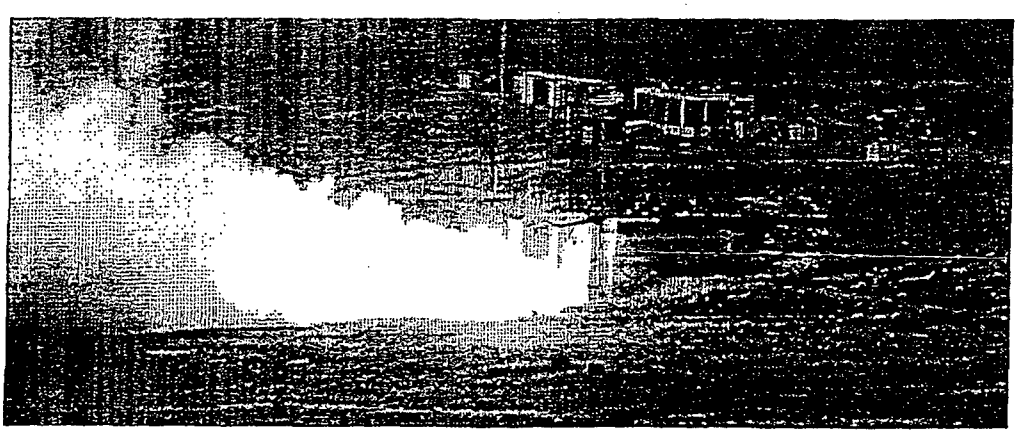

Fig 2: The IHPRPT Phase I Missile Propulsion demonstration, which occurred on November 16th 2000, utilized TSSS Missile Propulsion propellant technology.